REMARKS/ARGUMENTS

Rejection of Claims 1-9 under 35 U.S.C 101 as the claimed invention is directed to non-statutory subject matter.

Claim 1 has been amended to overcome this rejection. The amended claim 1 recites a method of defect cause analysis involving the steps of providing a sample having a plurality of defects, performing a defect inspection to determine the size and location of the defects, performing a chemical state analysis and a mapping analysis on the sample, and determining the root cause of the defects according to the result of the chemical state analysis and the mapping analysis.

Claim 7 has also been amended to overcome this rejection. The amended claim 7 recites a method of defect cause analysis involving the steps of providing a sample having a plurality of defects, performing a voltage contrast to identify the location of the defects, cutting the sample with a focused ion beam to expose a cross-section of the sample, performing a chemical state analysis and a mapping analysis on the sample, and determining a root cause of the defects according to the result of the chemical state analysis and the mapping analysis.

Specifically, the sample having a plurality of defects thereon has been processed through a series of semiconductor processes. After utilizing the mapping process to obtain a defect pattern from the sample and compare the defect pattern with a predetermined pattern obtained from a fabrication process of the series of semiconductor processes, the claimed invention is able to determine which particular semiconductor process causes the defect.

By specifying a condition where the sample is obtained and a result that the method

of the claimed invention aims to achieve, applicant asserts that the amended claim 1 now addresses a method that produces a concrete, tangible and useful result. Reconsideration of the claims 1-9 is therefore politely requested.

Rejection of Claims 1-9 under 35 U.S.C 112 as failing to comply with the written description requirement.

Specifically, paragraph [0022] of the claimed invention recites that an energy dispersive spectrometer can be utilized to perform a large scale examination on the second type of defects, a scanning auger microscopy or an auger electron spectroscopy can be utilized to perform an auger analysis on the third type of defects, and by comparing the component of a normal location with those of an excursion location, the component of defects can be obtained. Referring to the above specification, applicant asserts that the defect pattern disclosed in the claims is addressed corresponding to the excursion location stated in the paragraph whereas the predetermined pattern is addressed corresponding to the normal location.

Additionally, paragraph [0026] and Fig. 4 of the claimed invention recites an example of utilizing the chemical state analysis and the mapping analysis to locate the defects and compare the defects with a predetermined pattern obtained from a previous semiconductor process. Inspection of Fig. 4 of the claimed invention will reveal that in addition to the presence of the silicon oxide layer 262 and the tungsten lines 264, a plurality of defects is found between the tungsten lines 264. Referring to Fig. 4 and paragraph [0026], applicant asserts that the defect pattern disclosed in the claims is addressed with respect to the combination of the defects positioned between the tungsten lines 264, the silicon oxide layer 262 and the tungsten line 264 shown in Fig. 4, whereas the predetermined pattern is addressed with respect only to the silicon oxide layer 262 and the tungsten line 264. Thus, by comparing the defect pattern and the predetermined

pattern, users are able to determine that the root cause of the defects is resulted from the polymer residue of an etching process performed previously.

Rejection of Claims 1, 2, and 6-9 under 35 U.S.C 102(e) as being anticipated by Nozoe et al. (US 6777677B2).

Applicant asserts that Nozoe et al do not teach a method of defect root cause analysis as per the limitation disclosed in claim 1 of the claimed invention. According to the amended claime 1 of the claimed invention, after obtaining a sample, such as a die having a plurality of defects thereon, a defect inspection is performed to measure and determine the size and location of the defects. Subsequently, a chemical state analysis is performed to analyze different types of defects within a single die, in which the analysis primarily involves an inspection for defects having different forms of short circuits, broken circuits, or peeling. A mapping analysis is performed thereafter to obtain a defect pattern from the sample and compare the defect pattern with a predetermined pattern obtained from a previous semiconductor process and by comparing the two patterns, the claimed invention is able to determine which particular semiconductor process causes the defect. Specifically, the defects analyzed by the chemical state analysis and the mapping analysis are located within a single die.

In contrast to the claimed invention, the step of forming the defects into a defect pattern disclosed by Nozoe et al in column 18 lines 40 to 51 principally involves reviewing a plurality of defects in a particular sequence, in which the reviewing step is performed across a plurality of dies. In other words, applicant asserts that Nozoe et al only teach a means of reviewing individual defects according to a particular sequence, but fail to teach forming the defects into a defect pattern, as disclosed in the claimed invention. Inspection of Fig. 7A and Fig. 7B of Nozoe et al will reveal that the review

process is performed to scan the defects across a plurality of dies. The defects analyzed by the claimed invention however, are located in a single die.

Since the target and mechanism of forming the defects into a defect pattern by Nozle et al is significantly different from the claimed invention, those skilled in the art would find it physically impossible to combine the references in the manner suggested. Reconsideration of the amended claim 1 is therefore politely requested. As claims 2 and 6 are dependent upon claim 1, applicant asserts that if claim 1 is found allowable, claims 2 and 6 should additionally be found allowable. Reconsideration of the claims 2 and 6 is politely requested.

According to the amended claim 7 of the claimed invention, a method of defect cause analysis is disclosed, in which the method includes the steps of providing a sample having a plurality of defects, performing a voltage contrast to identify the location of the defects, cutting the sample with a focused ion beam to expose a cross-section of the sample, performing a chemical state analysis and a mapping analysis on the sample, and determining a root cause of the defects according to the result of the chemical state analysis and the mapping analysis. Specifically, the mapping process includes obtaining a defect pattern from the sample and comparing the defect pattern with a predetermined pattern obtained from a previous semiconductor process.

Similar to the arguments made for claim 1, the step of forming the defects into a defect pattern disclosed by Nozoe et al in column 18 lines 40 to 51 principally involves reviewing a plurality of defects in a particular sequence, in which the reviewing step is performed across a plurality of dies. In other words, applicant asserts that Nozoe et al only teach a means of reviewing individual defects according to a particular sequence, but fail to teach forming the defects into a defect pattern, as disclosed in the claimed invention. Inspection of Fig. 7A and Fig. 7B of Nozoe et al further reveals that the

review process is performed for scanning the defects across a plurality of dies. The defects analyzed by the claimed invention however, are located in a single die.

Since the target and mechanism of forming the defects into a defect pattern by Nozle et al is significantly different from the claimed invention, those skilled in the art would find it physically impossible to combine the references in the manner suggested. Reconsideration of the amended claim 7 is therefore politely requested. As claims 8-9 are dependent upon claim 7, applicant asserts that if claim 7 is found allowable, claims 8-9 should additionally be found allowable. Reconsideration of the claims 8-9 is politely requested.

Rejection of Claims 3-5 under 35 U.S.C 103(a) as being unpatentable over Nozoe et al. (US 6777677B2), in view of Moore et al (US 6777674B2).

Claims 3-5 are dependant upon currently amended claim 1. Applicant asserts that if claim 1 is found allowable, then claims 3-5 should additionally be found allowable as being dependant on claim 1.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Sincerely yours,

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Note: Please leave a message in my voice mail if you need to talk to me. (The time in D.C. is 12 hours behind the Taiwan time, i.e. 9 AM in D.C. = 9 PM in Taiwan.)